

August 9, 2002

Mr. Ron Josephson (5304W)  
U.S. EPA Headquarters  
Ariel Rios Building  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460

Dear Ron:

Please find enclosed an analysis generated by Eastman Chemical Company (Eastman) back in 1992, to determine if it was feasible to demonstrate and claim compliance with the headworks exemption at 40 CFR 261.3(a)(2)(iv)(B). As you develop a proposal to expand the current headworks exemption, this analysis may be useful in helping you understand the difficulty in utilizing the exemption, as it exists today. You're aware from your visit to Kingsport earlier this year that the Kingsport facility is a large, complex facility. Given that complexity, the large amounts of toluene used on-site on a weekly basis at that time, and to ensure compliance with all applicable RCRA regulations, Eastman decided that there was too much uncertainty in the toluene analysis to claim a headworks exemption at the not-to-exceed 25 ppm level.

It was (and is) no problem to determine the quantity of toluene at the headworks and in the wastewater. But the potential loss through air emissions was (and is) extraordinarily difficult to estimate through a materials balance approach because of a number of variables, including the following:

- the quantity of toluene being processed in reactors at any one point in time;
- the quantity of toluene being recovered on- or off-site;
- the quantity of toluene in nutche (filter) cloths going to incineration or in process; and
- the quantity of toluene in containers of mixed solvents awaiting incineration.

The enclosed tables represent a myriad of potential methodologies to demonstrate potential losses on a weekly basis and on an average basis over a six-month period. The following text discusses each table individually and should help you "walk through" each of the various methodologies.



**TABLE I:**

Table I shows a methodology based on beginning and ending inventories, what was purchased and what was estimated for each week in the August 12, 1991 to February 3, 1992 timeframe (a 26-week or six-month timeframe). A staff member, since retired, in solvent recovery provided information on the quantities of toluene recovered each week. A simple calculation was then done such that the amount purchased plus the amount recovered minus the change in inventory was equal to the amount dispensed. On the totals line, the 16,528 pounds change in inventory represents the estimated weekly loss that could not be accounted for. Eastman couldn't say that all those pounds were being discharged to the air; there were just too many potential other ways to account for a portion of that quantity. One example is saturated filter cloths that were being incinerated but that contained an unknown quantity of toluene. Regardless, based on this first methodology, 16,528 lbs would have been the calculated weekly "loss."

**TABLE II:**

In Table II, Eastman tried to account for the amount lost and unaccounted for over a period of time based on the difference between what was purchased and what left the system. So the quantity recovered off-site (at one of our other facilities) plus the quantity burned each week was compared to the amount purchased each week. For the 6-month period shown, the average loss each week was 20,079 pounds.

**TABLE III:**

Table III estimates the total losses to air and water, based on actual monitoring at the headworks, estimated air emissions, plus the estimated pounds of toluene dispensed, as calculated in Table I. The goal was to demonstrate that the total losses to air and wastewater did not exceed 25 ppm or 32,378 lbs/week, based on an influent flow rate of 22,184,000 gallons per day (GPD). First, the quantity going to wastewater was based on the concentration level at the headworks multiplied by the 22,184,000 gallons per day flow rate. As shown, the headworks concentration varied from 0.53 ppm to 11.62 ppm, far below the regulatory level of 25 ppm. It was assumed that 11.26% of the lbs of toluene dispensed were lost to the air (a worst-case analysis). This is based on the 6-months toluene materials balance shown on the very last page of the attached tables. An average of 16,569 lbs/week were estimated to have been lost over the 6-month period in that materials balance estimation, or 11.26% of the pounds estimated to be dispensed weekly. As shown in the last column, based on the preceding assumptions, the combined estimated emissions to the air and the known concentrations in the wastewater exceeded the 32,378 lbs/week for 3 of 26 weeks.

**TABLE IV:**

In Table IV, it was decided to run the same analysis as in Table III, but to assume that a less conservative 10% of the pounds dispensed were lost to the air. It was felt that this

assumption was still on the conservative side, given some variables unaccounted for on the process side. As shown, there was just one week when total air and wastewater losses exceeded the 32,378 lbs/week considered equivalent to 25 ppm.

**TABLE V:**

Table V represents the simplest analysis. It measures what goes to wastewater treatment and then accounts for losses to the air by assuming the average loss of 16,569 lbs/week that resulted from the materials balance estimation of what was unaccounted for on the last page of the attached tables. Using this methodology, there was never an exceedence of the 25 ppm during the 6-month period of analysis.

**FINAL PAGE—6-MONTHS' TOLUENE MATERIAL BALANCE**

This material balance exercise has been referred to earlier in this letter. It's a less-than-precise analysis, and doesn't take into account certain variables for which data were unavailable and that could not be estimated with any accuracy. Given that 2.65 million pounds of toluene were purchased during that six-month period and an estimated 3.8 million pounds dispensed (including toluene recovered and reused), it's just too difficult at this complex facility to determine compliance with a 25 ppm weekly standard around a materials balance.

Eastman encourages EPA to continue development of a proposal that would allow for a demonstration at the headworks, based on actual monitoring data. In the years since the headworks exemption was originally promulgated, many Clean Air Act standards have been put into place that should minimize any concern about air emissions under a RCRA regulation. Such a demonstration would reduce burden for the regulated community without a significant increase in risks to human health or the environment.

Should you have any questions about this analysis, Ron, please feel free to call me at 423-229-4120 or e-mail at [ndotson@eastman.com](mailto:ndotson@eastman.com).

Sincerely,



Nancy J. Dotson

Principal Environmental Representative

Eastman Corporate Health, Safety, Environment and Security

Eastman Chemical Company

P.O. Box 511

Kingsport, TN 37662-5054

TABLE I  
Toluene Inventory (lbs)

Week Beginning	Beginning Inventory	Ending Inventory	Change in Inventory	Material Placed in Storage			Dispensed*
				Purchased	Recovered	Dispensed*	
8/12	283,698	240,708	-	44,580	62,250	149,820	
8/19	240,708	372,880	+	143,440	39,765	51,033	
8/26	372,880	377,254	+	48,680	113,150	157,456	
9/2	377,254	379,127	+	44,420	65,938	108,485	
9/9	379,127	361,724	-	0	20,244	37,647	
9/16	361,724	333,209	-	43,239	160,072	231,826	
9/23	333,209	370,791	+	48,900	20,244	31,562	
9/30	370,791	342,225	-	192,000	67,420	287,986	
10/7	342,225	380,002	+	93,760	14,460	70,443	
10/14	380,002	337,243	-	91,380	0	134,139	
10/21	337,243	345,948	+	98,500	58,708	148,503	
10/28	345,948	358,203	+	49,560	30,727	68,032	
11/4	358,203	328,893	-	143,500	44,537	217,347	
11/11	328,893	365,693	+	92,840	38,471	94,511	
11/18	365,693	322,350	-	92,020	0	135,363	
11/25	322,350	320,224	-	95,680	0	97,806	
12/02	320,224	365,101	+	91,909	57,695	104,727	
12/09	365,101	175,884	-	45,540	0	234,757	
12/16	175,884	290,270	+	144,560	25,305	55,479	
12/23	290,270	304,014	+	134,560	50,610	171,426	
12/30	304,014	278,861	-	49,520	46,561	121,234	
01/06	278,861	279,584	+	192,860	42,512	234,649	
01/13	279,584	346,346	+	237,760	36,439	207,437	
01/20	346,346	306,697	-	144,480	0	184,129	
01/27	306,697	315,112	+	141,060	80,542	213,187	
02/03	315,112	300,226	-	147,580	114,957	277,423	
TOTALS:			(16,528)	2,652,328	1,190,607	3,826,407	

\*Dispensed = Purchased + Recovered - (change in inventory)

brh/CLG8L003  
(4/14/92)

TABLE II  
Toluene Material Balance

Week Beginning	lbs Toluene			Total	Difference Purchased and Recovered/Burned (lbs)
	Purchased	Recovered Off-Site	Burned		
8/12	44,580	3,909	76,606	80,515	(35,935)
8/19	143,440	3,441	35,516 *	38,957	104,483
8/26	48,680	2,255	27,117	29,372	19,308
9/2	44,420	2,677	96,152	98,829	(54,409)
9/9	0	1,610	64,541	66,151	(66,151)
9/16	43,239	3,241	96,734	99,975	(56,736)
9/23	48,900	2,039	67,266	69,305	(20,405)
9/30	192,000	3,804	29,154	32,958	159,042
10/7	93,760	2,665	25,588	28,253	65,507
10/14	91,380	0	38,782	38,782	52,598
10/21	98,500	0	40,376	40,376	58,124
10/28	49,560	5,350	98,699	104,049	(54,489)
11/4	143,500	3,948	34,741	38,689	104,811
11/11	92,840	0	118,798	118,798	(25,958)
11/18	92,020	3,687	103,733	107,420	(15,400)
11/25	95,680	0	76,742	76,742	18,938
12/02	91,909	6,081	65,237	71,318	20,591
12/09	45,540	3,413	120,730	124,143	(78,603)
12/16	144,560	3,011	78,268	81,279	63,281
12/23	134,560	2,964	55,941	58,905	75,655
12/30	49,520	0	133,652	133,652	(84,132)
01/06	192,860	0	41,566	41,566	151,294
01/13	237,760	3,268	228,579	231,847	5,913
01/20	144,480	140	54,825	54,965	89,515
01/27	141,060	0	79,420	79,420	61,640
02/03	147,580	0	184,008 **	184,008	(36,428)
Total	2,652,328	57,503	2,072,771	2,130,274	522,054
Average	102,013	2,212	79,722	81,934	20,079

\* Toluene content of approximately 250,000 lbs of mixed solvents not included in value reported. Analytical data not available.  
 \*\* Value includes 95,160 lbs. burned; 72,300 lbs. stored and 16,528 lbs. increase in inventory during 26 weeks.

TABLE III  
Toluene Data

Week Beginning	lbs Toluene Dispensed	Headworks Concentration mg/L	lbs Toluene/Week		
			Calculated (1) Air Emissions	(2) Wastewater	Total (3) Air + Wastewater
8/12	149,820	0.68	16,870	881	17,750
8/19	51,033	0.75	5,746	971	6,718
8/26	157,455	0.53	17,730	686	18,416
9/2	108,485	1.04	12,215	1,347	13,562
9/9	30,647	5.64	3,451	7,304	10,755
9/16	231,826	1.40	26,104	1,813	27,917
9/23	31,562	1.76	3,554	2,279	5,833
9/30	287,986	1.98	32,427	2,564	34,992 *
10/7	70,443	1.77	7,932	2,292	10,224
10/14	134,139	1.95	15,104	2,525	17,629
10/21	148,503	2.52	16,721	3,264	19,985
10/28	68,032	1.33	7,660	1,722	9,383
11/4	217,347	2.23	24,473	2,888	27,361
11/11	94,511	3.07	10,642	3,976	14,618
11/18	135,363	2.16	15,242	2,797	18,039
11/25	97,806	2.38	11,013	3,082	14,095
12/02	104,727	1.69	11,792	2,189	13,981
12/09	234,757	1.52	26,434	1,969	28,402
12/16	55,479	3.58	6,247	4,636	10,883
12/23	171,426	2.47	19,303	3,199	22,501
12/30	121,234	2.41	13,651	3,121	16,772
01/06	234,649	4.11	26,421	5,323	31,744
01/13	207,437	11.62	23,357	15,049	38,406 *
01/20	184,129	6.83	20,733	8,846	29,578
01/27	213,187	3.14	24,005	4,067	28,071
02/03	277,423	1.83	31,238	2,370	33,608 *

- 1) Amount equals 11.26% x lbs dispensed.
- 2) Amount equals Headworks Concentration x 22,184,000 GPD Flow.
- 3) Based on Influent Flow of 22,184,000 GPD, 25 ppm equals 32,378 lbs/week.
- \* Exceeds 32,378 lbs/week

TABLE IV  
Toluene Data

lbs Toluene/Week						
Week Beginning	lbs Toluene Dispensed	Headworks Concentration mg/L	Calculated (1) Air Emissions	(2) Wastewater	Total (3) Air + Wastewater	
8/12	149,820	0.68	14,982	881	15,863	
8/19	51,033	0.75	5,103	971	6,075	
8/26	157,456	0.53	15,746	686	16,432	
9/2	108,485	1.04	10,849	1,347	12,195	
9/9	30,647	5.64	3,065	7,304	10,369	
9/16	231,826	1.40	23,183	1,813	24,996	
9/23	31,562	1.76	3,156	2,279	5,436	
9/30	287,986	1.98	28,799	2,564	31,363	
10/7	70,443	1.77	7,044	2,292	9,337	
10/14	134,139	1.95	13,414	2,525	15,939	
10/21	148,503	2.52	14,850	3,264	18,114	
10/28	68,032	1.33	6,803	1,722	8,526	
11/4	217,347	2.23	21,735	2,888	24,623	
11/11	94,511	3.07	9,451	3,976	13,427	
11/18	135,363	2.16	13,536	2,797	16,334	
11/25	97,806	2.38	9,781	3,082	12,863	
12/02	104,727	1.69	10,473	2,189	12,661	
12/09	234,757	1.52	23,476	1,969	25,444	
12/16	55,479	3.58	5,548	4,636	10,184	
12/23	171,426	2.47	17,143	3,199	20,341	
12/30	121,234	2.41	12,123	3,121	15,245	
01/06	234,649	4.11	23,465	5,323	28,788	
01/13	207,437	11.62	20,744	15,049	35,793 *	
01/20	184,129	6.83	18,413	8,846	27,258	
01/27	213,187	3.14	21,319	4,067	25,385	
02/03	277,423	1.83	27,742	2,370	30,112	

1) Amount equals 10% x lbs dispensed.  
 2) Amount equals Headworks Concentration x 22,184,000 GPD Flow.  
 3) Based on Influent Flow of 22,184,000 GPD, 25 ppm equals 32,378 lbs/week.  
 \* Exceeds 32,378 lbs/week

TABLE V

Toluene Data

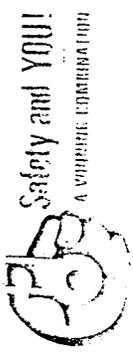
lbs toluene/week

Week Beginning	Headworks Concentration mg/L	Wastewater	Air (1) Emissions	Total (2) Air + Wastewater
8/12	0.68	881	16,569	17,450
8/19	0.75	971	16,569	17,540
8/26	0.53	686	16,569	17,255
9/2	1.04	1,347	16,569	17,916
9/9	5.64	7,304	16,569	23,873
9/16	1.40	1,813	16,569	18,382
9/23	1.76	2,279	16,569	18,848
9/30	1.98	2,564	16,569	19,133
10/7	1.77	2,292	16,569	18,861
10/14	1.95	2,525	16,569	19,094
10/21	2.52	3,264	16,569	19,833
10/28	1.33	1,722	16,569	18,291
11/4	2.23	2,888	16,569	19,457
11/11	3.07	3,976	16,569	20,545
11/18	2.16	2,797	16,569	19,366
11/25	2.38	3,082	16,569	19,651
12/02	1.69	2,189	16,569	18,758
12/09	1.52	1,969	16,569	18,538
12/16	3.58	4,636	16,569	21,205
12/23	2.47	3,199	16,569	19,768
12/30	2.41	3,121	16,569	19,690
01/06	4.11	5,323	16,569	21,892
01/13	11.62	15,049	16,569	31,618
01/20	6.83	8,846	16,569	25,415
01/27	3.14	4,067	16,569	20,636
02/03	1.83	2,370	16,569	18,939

1) 16,569 lbs/week is average for 26 week period.

2) Based on influent flow of 22,184,000 GPD, 25 ppm equals 32,378 lbs/week.

6 Months



# TOLUENE MATERIAL BALANCE (lbs)

AVERAGE lb/week

Total (lbs)  
2,652,328

5.3 M

**I. PURCHASED**

**II. Dispensed**

3,842,306

**III. Material Accounting**

a. Recovered off-site

57,503

b. wastewater influent<sup>(1)</sup>

91,260

c. Burned

1,983,943

d. Increase in tank inventory

16,528

e. stored externally

77,300

**TOTAL**

2,221,534

104,000

200,000

4.0 M

**IV. MATERIAL NOT ACCOUNTED FOR**

430,794

16,569

**V. Estimated Losses**

- 11.26% of lbs dispensed

- 16.24% of lbs purchased

(1) lbs = average conc. toluene X average influent flow

= 2.71 mg/L X 22,184,000 gpd X 8.34 lbs/gal

= 91,260

\*\*\*IF YOU HAVE DIFFICULTY RECEIVING THIS FAX, PLEASE NOTIFY SENDER\*\*\*

FAX TO: 703-308-0522

INTERNET ADDRESS: [ndotson@eastman.com](mailto:ndotson@eastman.com)

FACSIMILE NO: 423-229-4864

PHONE NO: 423-229-4120

KINGSPORT, TN 37662

P.O. BOX 511

100 NORTH EASTMAN ROAD

EASTMAN CHEMICAL COMPANY

NANCY J. DOTSON

ADDRESS:

COMPANY:

NAME:

\*\*\*\*\*

Ron, here are the materials we've discussed regarding an attempted materials balance demonstration for toluene at the Kingsport facility relevant to the headworks exemption. I will use regular mail to send you the originals.

MESSAGE:

\*\*\*\*\*

COVER SHEET + 9 PAGES TO FOLLOW

FROM: NANCY DOTSON

TO: RON JOSEPHSON, EPA

DATE: August 9, 2002

FACSIMILE TRANSMISSION

